

World Exploration Trends



A Special Report from
Metals Economics Group for the
PDAC International Convention 2007

MEG

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The PDAC was pleased to work with Metals Economics Group to make this special report on World Exploration Trends available to our members and PDAC Convention 2007 delegates. The PDAC uses Metals Economics Group's *Corporate Exploration Strategies (CES)* as an essential tool for obtaining information on global exploration trends. *CES* is acknowledged as the primary source of information on exploration and mining statistics worldwide.

Tony Andrews, *Executive Director*, PDAC



Corporate Exploration Strategies

Briefly, *Corporate Exploration Strategies* examines the nonferrous exploration activities of all mining companies worldwide. Volume I provides a ten-year summary of trends in exploration spending and an industry-wide analysis of allocations by location, target, stage of development, and more. Volume II reports in detail each company's exploration budget and its breakdown by country, target, and stage of development. Companies with significant exploration budgets are given special attention – each company's current exploration program, strategy, and most advanced exploration projects are profiled in detail. The study also includes an appendix of companies that do not have exploration budgets but which do have significant exploration projects for which they are seeking financing or joint ventures.

Subscribers to *Corporate Exploration Strategies* include most major mining companies, national and provincial governments, mining service and equipment companies, and financial institutions. Mining companies typically use *Corporate Exploration Strategies* for benchmarking their exploration programs, developing competitor intelligence, strategic planning, and corporate and board presentations. Governments and mining industry associations use the *CES* in a similar way – benchmarking country exploration budgets and gathering intelligence on national competitors for exploration spending – as well as analyzing trends to develop mineral policy. Mining service and equipment companies perform market and strategic-trend analysis as well, but also use the *CES* to shift resources to emerging markets, target specific clients, and develop competitor intelligence. Financial groups commonly use the *CES* for investment decision support and mining-market and strategic-trend analysis.

World Exploration
Budgets 2006

Overview

Worldwide exploration budgets reach new high-water mark

According to Metals Economics Group's seventeenth annual edition of *Corporate Exploration Strategies*, worldwide allocations for commercially oriented nonferrous exploration reached \$7.5 billion in 2006 – the fourth consecutive yearly increase since the bottom of the cycle in 2002 and a new high-water mark for global nonferrous exploration.

(All figures in this report are in U.S. dollars.)

Worldwide nonferrous exploration budgets steadily increased through the early 1990s to a crest of \$5.2 billion in 1997 (see Figure 1), before falling for five straight years to a 12-year low of \$1.9 billion in 2002 – an overall decline of more than 63%. Since 2002, our estimated total has risen for four straight years to set a new high-water mark for worldwide nonferrous exploration. In Metals Economics Group's 2006 analysis, 1,624 companies' exploration budgets (using a \$100,000 cutoff) total \$7.13 billion, which we estimate covers almost 95% of worldwide commercially oriented nonferrous exploration expenditures. Adding estimates for budgets that we could not obtain brings our estimated total of 2006 exploration expenditures to \$7.5 billion – up 47% (\$2.4 billion) from 2005 and nearly 300% (\$5.6 billion) cumulatively since the bottom of the cycle. (All historic exploration figures represent dollars of the day and have not been inflation-adjusted.)

Following the 1997 peak of exploration spending, a combination of substantial cutbacks by the majors, the negative impact of industry consolidation, and a loss of funding for most junior companies contributed to five straight years of declining exploration budgets to the 12-year low in 2002. The initial increase in worldwide exploration since 2002's low can be attributed to a combination of increased spending by the majors as they recognized the dearth of new projects moving up the pipeline, significantly reduced industry consolidation from peak levels in 2000 and 2001, and increased spending by the junior sector on the back of higher gold prices and rising investor interest. As the gold price continued to rise and prices for other commodities began to reach long-term highs, yearly budget increases by the majors in their ongoing struggle to replace mined reserves and meteoric increases by the juniors pushed the estimated worldwide exploration total to the 2006 high.

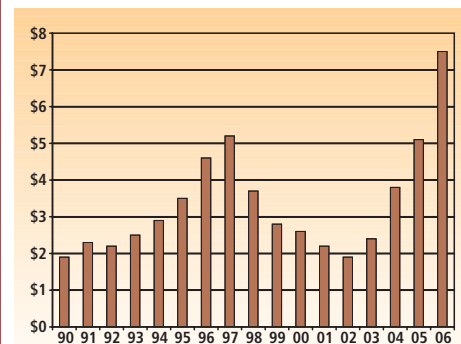
The rising cost of exploration

We do not adjust historic exploration figures for inflation to attempt "constant dollar" comparisons, but doing so would certainly show that more is being invested in exploration today than a decade ago. However, the increased demand for services such as drilling and assaying, and rising input costs on everything from fuel to geoscientists, have significantly increased the costs of exploration in the current cycle beyond overall inflation. While there is anecdotal evidence of a substantial rise in exploration activity in recent years, higher costs make it unlikely that the growth in activity has paralleled the substantial increase in exploration budgets over the past few years.

Junior explorers lead the recovery, and now account for more than half of global exploration

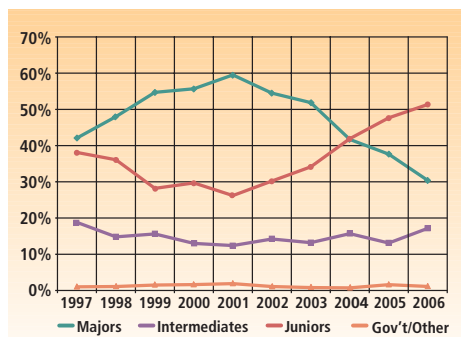
Figure 2 (page 2) shows the distribution of exploration budgets for major, intermediate, and junior companies, and for commercially oriented government-controlled entities included in our study from 1997 to 2006. While each industry group has generally followed the overall exploration trend in dollar terms through this period (as shown in Figure 1), the junior explorers have proved to be the most volatile group, suffering the steepest budget declines during bad times and enjoying dramatic increases during the booms.

Figure 1: Estimated Total Worldwide Exploration Budgets, 1990-2006 (US\$ billions)



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Figure 2: Worldwide Exploration Budgets by Company Type, 1997-2006 (as a percentage of worldwide exploration)



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At the 1997 peak of exploration spending, cashed-up juniors accounted for slightly less than 40% of worldwide exploration. The sharp decline in metals prices that followed and persisted through 2001, exacerbated in the early years by industry scandal and the popularity of investing in the dot-com sector, diminished the juniors' ability to secure financing for exploration. This resulted in a steeper decline in exploration allocations by the juniors than by the other industry groups during the period, as the juniors' share of worldwide exploration spending declined to only about 25% in 2001. Although the other industry groups made deep cuts to their own exploration budgets following the 1997 peak, the majors began to shoulder a larger share of the reduced global exploration effort as their portion of the worldwide total rose from 42% in 1997 to almost 60% in 2001.

The revival of junior exploration spending began in mid-2002, as a recovering gold price began to reawaken many dormant junior companies. As prices for most commodities have strengthened to long-term highs in recent years, the improvement in mining industry investment has provided most juniors with the funds necessary to restart exploration and encouraged a flurry of IPO activity on the primary stock exchanges. Since the bottom of the cycle in 2002, junior exploration spending has increased a remarkable 600%, accounting for most of the overall increase in exploration allocations by all companies from 2002 to 2006. As Figure 2 shows, the substantial increase in junior exploration budgets relative to the increases in

other groups' budgets over this time frame allowed the juniors' combined budgets to surpass those of the majors for the first time in 2004 (albeit by only a little more than \$7 million), before continuing to outstrip increases by the other groups in the following two years. The juniors now account for more than half of 2006's worldwide exploration budget total – the highest proportion allocated by the juniors since we began this series of studies.

The effects of consolidation on exploration

Examining the effects of high-level industry consolidation over the past decade shows that large portions of the acquired companies' exploration budgets typically disappear in the year following the acquisition, despite incorporating an expanded exploration portfolio. Table 1 lists the number of companies acquired each year (generally with an acquisition price of more than \$50 million and a substantive exploration budget in the year of acquisition), their exploration budgets in the year they were acquired, and the cumulative effect on their budgets in the post-acquisition year. (For the purpose of this discussion, we have treated mergers as acquisitions.) Although overhead synergies certainly contribute to the decline in a surviving company's exploration budget compared with the combined budgets of the premerged companies, the year-on-year declines shown in the table can often be attributed to actual cuts to exploration programs – particularly during the downward leg of the exploration cycle.

Table 1: Effect of Consolidation on Exploration Budgets in the Year Following an Acquisition, 1997-2006 (US\$ mil)

Year of Acquisition	Number of Companies Acquired with Substantial Budgets	Acquired Companies' Total Budgets in Acquisition Year	Buyers' Total Budgets in Acquisition Year	Combined Budgets of all Companies in Acquisition Year	Merged Companies' Total Budgets in Year Following Acquisition	Decline in Budgets by Merged Companies
2006	24	\$424.1	\$453.9	\$878.0	N/A	N/A
2005	16	\$238.3	\$545.7	\$784.0	\$775.3	-\$8.7
2004	4	\$50.0	\$51.8	\$101.8	\$51.0	-\$50.8
2003	3	\$33.4	\$66.5	\$99.9	\$86.9	-\$13.0
2002	7	\$44.5	\$74.7	\$119.2	\$113.0	-\$6.2
2001	9	\$171.4	\$249.7	\$421.1	\$281.6	-\$139.5
2000	9	\$100.2	\$448.1	\$548.3	\$406.9	-\$141.4
1999	7	\$78.1	\$341.3	\$419.4	\$371.5	-\$47.9
1998	9	\$115.8	\$298.1	\$413.9	\$346.8	-\$67.1
1997	7	\$100.4	\$293.8	\$394.2	\$304.8	-\$89.4
Totals	95	\$1,356.2	\$2,823.6	\$4,179.8	\$2,737.8	-\$564.0

Data sources: MEG's Corporate Exploration Strategies, Gold and Base Metals Acquisitions services, MineSearch database

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From 1997 through 2004, the demise of 55 significant mining and exploration companies effectively erased a cumulative \$555 million from worldwide exploration spending. While high-level acquisitions had a negative effect on exploration in each year, industry consolidation in 2000 and 2001 accounts for more than half the total decline in exploration due to acquisitions from 1997 to 2004, and is responsible for more than 46% of the decline in worldwide exploration spending from 2000 to 2002. While the acquisitions in 2000 and 2001 were mainly consolidations among major companies, many acquisitions over the following three years were smaller and intermediate miners with less substantial budgets – none of the 14 companies acquired from 2002 to 2004 had an exploration budget of more than \$20 million, compared with seven companies with budgets greater than \$20 million acquired in 2000 and 2001 – and as a result, acquisitions had a less negative impact on exploration from 2003 to 2005.

In 2005, industry consolidation accelerated as the struggle to replace depleted reserves contributed to a wave of acquisition activity. However, despite the sizeable increases in both the number of companies acquired and their combined 2005 budgets, the acquisitions had a relatively small overall effect on 2006 exploration budgets compared to previous years – the average decline in 2006 exploration budgets by companies newly combined in 2005 was only \$500,000 compared with an average cut of almost \$10 million per merger or acquisition over the preceding eight years.

Industry consolidation continued to accelerate in 2006 – we saw 24 significant acquisitions or offers during the year involving companies with combined 2006 budgets totaling \$424 million – a marked increase over the record level set in 2005. While we can make intelligent guesses as to what may happen to certain acquired companies' exploration budgets within the surviving companies' budget next year, it remains to be seen what the net effect of 2006's record level of consolidation will be on 2007's overall exploration. Although consolidation's effect on exploration appears to vary depending on whether the global exploration effort is increasing or decreasing, it has had a negative effect on exploration in every year over the past decade, regardless of where we are in the exploration cycle.

Latin America leads for more than a decade

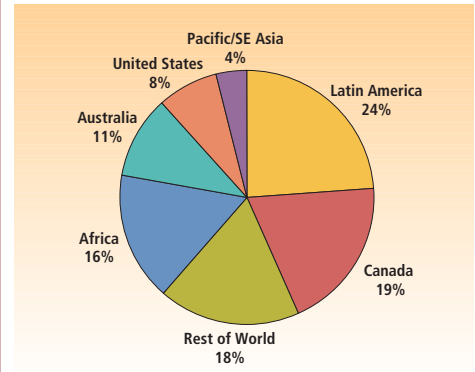
Figure 3 (right) shows the regional distribution of the \$7.13 billion in commercially oriented nonferrous exploration allocations by the 1,624 companies included in our 2006 study, and a five-year comparison of the regional allocations as a percentage of each year's worldwide exploration total.

Exploration allocations by surveyed companies increased in each of our regional categories for the fourth consecutive year. With Mexico and Brazil showing the largest gains in the region, Latin America continued to be the most popular destination for exploration – a position it has held for well over a decade – increasing its lead for the third consecutive year over second-place Canada, after Canada's exploration tax incentives helped close the gap to less than \$50 million in 2003. Interest in new, underexplored regions continued to rise in 2006, highlighted by increased allocations to our rest-of-world region (including Europe, the Former Soviet Union, Asia, and the Middle East), led by substantial increases in Russia, China, and Mongolia (although much of the increase in Mongolia is attributable to one company), lifting the region into third place ahead of Africa, which had held third place since 2003. Despite the slowest year-on-year growth among the seven regions shown, Australia remained solidly in fifth place by region and second place by country. The United States and the Pacific/Southeast Asia regions remained in sixth and seventh place, respectively, positions they have held since 2001.

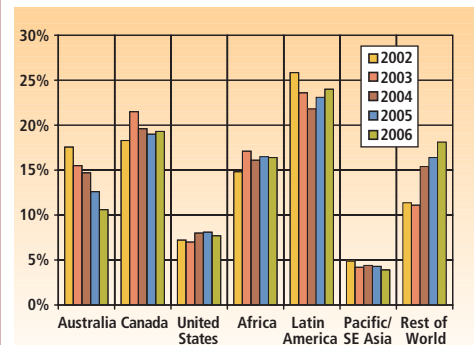
New exploration in regions traditionally perceived to have higher political risk has been the hallmark of the current exploration cycle. The push into these regions continued in 2006, highlighted by the increased allocations to our rest-of-world region (particularly Asia and the Former Soviet Union), parts of Africa, and some Latin American countries. This shift is partly due to the perception that traditionally lower-risk countries are already well explored and the growing acceptance that the discovery of large-scale deposits will be more likely in higher-risk areas. In addition, some countries previously perceived to be higher-risk appear to be moving towards political stability, although uncertainties remain. Nonetheless, we expect this trend to continue in 2007 as the ongoing struggle to replace reserves makes exploration in emerging markets the norm.

Figure 3: Worldwide Nonferrous Exploration Budgets by Region

Worldwide Exploration Budgets by Region, 2006 (1,624 companies' budgets totaling \$7.13 billion)



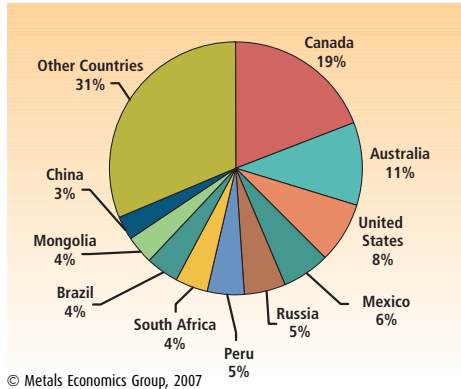
Worldwide Exploration Budgets by Region, 2002-2006 (as a percentage of worldwide exploration)



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Figure 4: 2006 Exploration Budgets for the Top Ten Countries

(top ten countries' budgets account for 69% of 2006 total budgets of \$7.13 billion)



Conversely, the threat of resource nationalization that has emerged in some Latin American, African, and central Asian countries (real or perceived) will likely dampen exploration growth in these countries in the near future, as in Venezuela, where exploration allocations fell by 40% year-on-year in 2006, dropping the country from sixth place in the region to eleventh. Shifting tax and royalty regimes in South America, southern Africa, and central Asia may also slow future growth, as some governments in these regions look for a greater share of increased mining company revenues.

Continued growth in Mexico, China, and Mongolia

Figure 4 (left, above) illustrates the distribution of 2006 exploration budgets for the ten countries with the highest allocations, which account for 69% of the overall budget total, the same as in 2005, but slightly below the 70%-73% range seen in the previous five years. The 2006 edition of *Corporate Exploration Strategies* registered allocations for 116 countries, compared with 103 in 2005 and only 93 at the bottom of the cycle in 2002.

The traditional big three – Canada, Australia, and the United States – head the list in 2006, while Mexico jumped from sixth to fourth place, moving Russia and Peru back to the fifth and sixth spots, respectively. South Africa remained in seventh place, while Brazil moved from ninth to eighth place. Chile and Argentina, which occupied the eighth and tenth spots in 2005, respectively, dropped off the top-ten list, with Mongolia and China claiming the ninth and tenth slots in 2006.

Allocations for all commodities reach new highs

Examining exploration allocations by target shows that gold, base metals, diamonds, platinum group metals, and other targets (primarily silver, but also molybdenum, cobalt, mineral sands, and industrial minerals) all reached record levels in 2006. Figure 5 (left, below) illustrates the distribution of the \$7.13 billion in exploration allocations by target for the 2006 surveyed companies, and a five-year comparison of allocations to each target as a percentage of each year's worldwide exploration total. Gold fell to just under 45% of the overall budget total in 2006 – its lowest share since it attracted less than 43% of worldwide allocations in 2001, and the sixth year of the past seven that gold

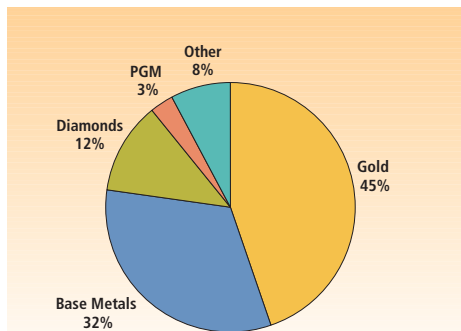
has accounted for less than 50% of worldwide spending. Despite a fourfold increase in gold allocations since the bottom of the exploration cycle in 2002, allocations to gold in 2006 are only marginally more than the previous peak in 1997, when gold represented 65% of overall spending. Given the increase in costs discussed on page 1 of this report, the 2006 gold budget likely represents significantly less work on the ground than ten years ago, despite being at an all-time high.

Base metals allocations have increased significantly over the past four years as copper, nickel, and zinc prices have risen steadily and are at or near record levels. The percentage of overall spending attributable to base metals has maintained an inverse relationship to that of gold over the past decade; in 2006, base metals spending represented more than 32% of total exploration allocations but was still below the 2001 peak of 39%. Copper allocations have accounted for at least half of the base metals total for more than a decade, and 2006's copper budget – a new high for the second consecutive year – represented 59% of the 2006 base metals total. Nickel exploration also increased over the previous year's record high, while zinc allocations doubled for the second consecutive year to surpass its previous peak, rising 500% since bottoming in 2003.

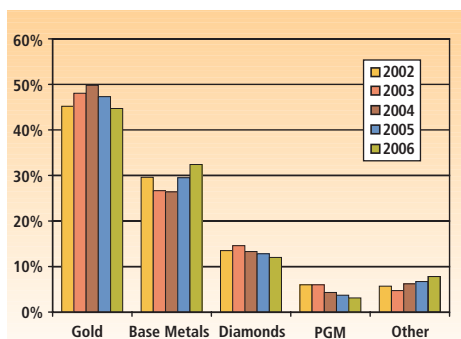
Diamond allocations increased for the fourth consecutive year in 2006. Since the early 1990s, when the discovery of diamonds in northern Canada sparked a diamond exploration boom, Canada has increasingly vied with Africa as the most popular destination for diamond exploration – in the ten years from 1997 to 2006, diamond allocations for Africa totaled \$1.54 billion compared with \$1.3 billion for Canada. Despite recording the weakest growth for the second consecutive year, exploration allocations for platinum group metals increased by 22% in dollar terms in 2006, while budgets for other targets rose 69% year-on-year, led by rising silver allocations.

Figure 5: Worldwide Nonferrous Exploration Budgets by Target

Worldwide Exploration Budgets by Target, 2006 (1,624 companies' budgets totaling \$7.13 billion)



Worldwide Exploration Budgets by Target, 2002-2006 (as a percentage of worldwide exploration)



Late-stage allocations exceed grassroots exploration for second year

Figure 6 (right) illustrates the distribution of the \$7.13 billion in exploration allocations by stage of development for the companies included in our 2006 study, and a five-year comparison of allocations to each stage as a percentage of each year's worldwide exploration total. Late-stage exploration has become increasingly important in the current exploration cycle; the above-average increases in late-stage budgets over the past three years have far outstripped the increases in grassroots budgets. As a result, total late-stage budgets exceeded total grassroots budgets by a substantial margin in 2006 after narrowly surpassing grassroots allocations (by only \$3 million) for the first time in 2005. By comparison, in the decade prior to 2004, total grassroots budgets were on average more than 50% higher than total late-stage budgets. We expect the trend of increased late-stage allocations to continue into 2007, as companies push to bring projects to a production decision.

Looking forward

Years of stagnant and declining metals prices in the late 1990s and the resulting lack of exploration and mine development, coupled with a resurgence in worldwide industrial growth led by China and India, have driven the markets into an imbalance that is taking time to correct. While the recent sharp recovery in exploration spending has produced significant anecdotal success, the deep cuts to exploration spending from 1998 to 2002 have resulted in a decline in the rate of substantial discoveries in recent years. Although the existing pipeline includes a handful of substantial projects slated for development within the next five years, and a number of smaller projects that could be developed further out (although many of these are currently not of a size to be attractive to the majors), the lack of new large-scale projects entering the pipeline will continue to pressure global supply. Even if the recovery in exploration spending produces a number of new large-scale projects, the time required to take a project from discovery through to production (coupled with rising development and production costs) ensures that any new discoveries will not benefit global supply for many years. Although some metals prices have come off their recent long-term and record highs, they will likely remain strong as long as demand remains high enough to maintain the market imbalance that the industry has so far been unable to correct.

Exploration will continue to rise in 2007

The continuation of the current junior-led boom in exploration relies largely on the junior companies' ability to raise capital, which has yet to show signs of slowing. Many juniors already have the cash to at least partially fund their 2007 exploration programs, and continued strong metals prices will help them maintain investor interest for the short term. In addition, the reserves replacement requirements and growth aspirations of the major and intermediate companies – coupled with the rising costs of replacing reserves through acquisitions – ensure that exploration will continue to be an important part of these companies' overall strategy. A number of large companies already plan to maintain or increase their exploration budgets in 2007, and some have even released multiyear investment plans showing gradual exploration increases over the next three to five years.

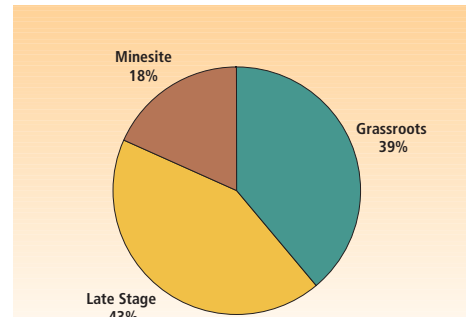
Although the wave of consolidation in 2006 may negatively affect exploration spending in 2007, the fact that we are on the upward leg of the exploration cycle suggests the net effect will be less severe (proportionately) than during the exploration downtrend. In addition, the continued rise in exploration costs will make even maintaining 2006's level of exploration activity more expensive in 2007. In summary, we expect the combination of rising exploration activity and continued cost increases to outweigh the potentially negative effect of 2006's record level of industry consolidation, resulting in a continued increase in worldwide exploration spending in 2007 – although the rate of growth may be constrained more by the availability of equipment, services, and personnel than by a lack of available capital.

Jason Goulden

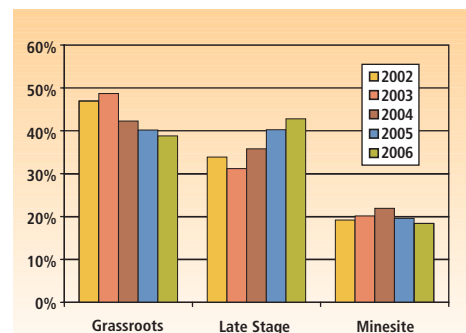
Director, Corporate Exploration Strategies

Figure 6: Worldwide Nonferrous Exploration Budgets by Stage of Development

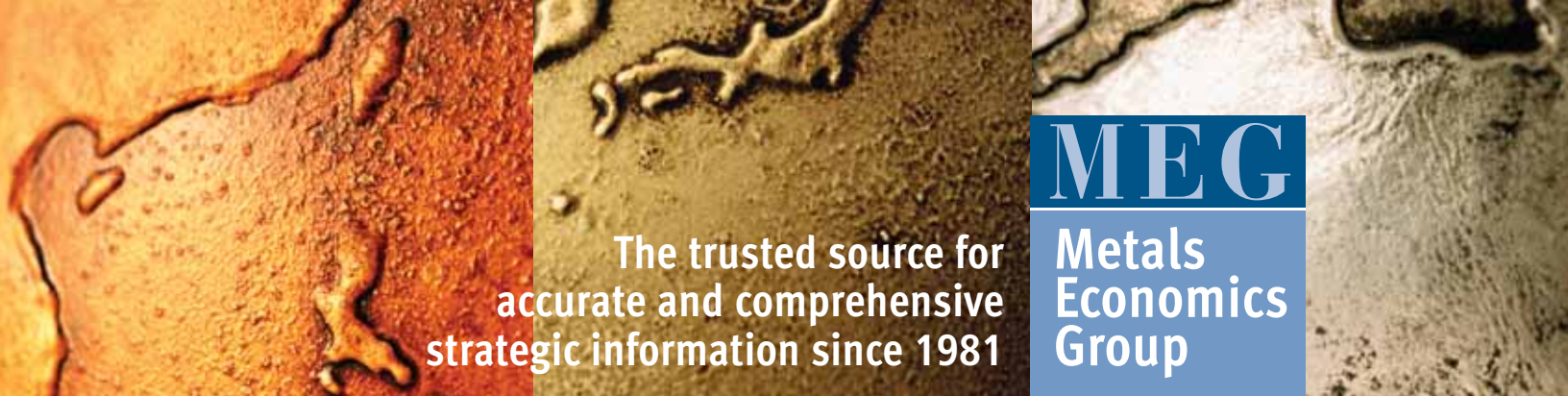
Worldwide Exploration Budgets by Stage, 2006
(1,624 companies' budgets totaling \$7.13 billion)



Worldwide Exploration Budgets by Stage, 2002-2006
(as a percentage of worldwide exploration)



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Metals Economics Group Services

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Strategies for Gold Reserves Replacement (published in June 2006) and *Strategies for Copper Reserves Replacement* (June 2005) present a detailed and practical look at how major companies are replacing their reserves, and the cost per ounce and per pound to replace reserves in gold and copper, respectively. These studies include reserves and production profiles for major producers over ten years (as available), all discoveries of large deposits, exploration budgets, acquisitions, and the project pipeline. So that subscribers can do their own analysis, the underlying information is available online for downloading.

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